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<120> Novel Bt Toxin Receptors From  
Lepidopteran Insects and Methods of Use

<130> 35718/204664

<150> 60/166,285

<151> 1999-11-18

<160> 11

<170> FastSEQ for Windows Version 4.0

<210> 1

<211> 5498

<212> DNA

<213> Ostrinia nubilalis

<220>

<221> CDS

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gctcaaatat taaaattcta cataactaag gatcatgcaa a atg ggg gtt gag agg	176
Met Gly Val Glu Arg	
1 5	

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Phe Phe Pro Ala Val Leu Leu Val Ser Leu Ala Ser Ala Ala Leu Ala	
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Asn Gln Arg Cys Ser Tyr Ile Ile Ala Ile Pro Arg Pro Glu Thr Pro	
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Glu Leu Pro Pro Ile Asp Tyr Glu Gly Lys Ser Trp Ser Glu Gln Pro	
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cta ata ccc ggc ccg acc cga gag gaa gta tgt atg gag aac ttc tta	368
Leu Ile Pro Gly Pro Thr Arg Glu Glu Val Cys Met Glu Asn Phe Leu	
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ccg gat caa atg att cag gtc ata tac atg gag gaa gaa atc gaa gga	416
Pro Asp Gln Met Ile Gln Val Ile Tyr Met Glu Glu Glu Ile Glu Gly	
70 75 80 85	

gac gtc atc att gcg aag ctt aac tat caa ggg tcc aac acg ccg gtg	464
Asp Val Ile Ile Ala Lys Leu Asn Tyr Gln Gly Ser Asn Thr Pro Val	
90 95 100	

ctg tcg att atg tca ggc cag ccc aga gcc cag ctg ggc cct gag ttt	512
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cga	cag	aat	gaa	gca	gac	ggc	caa	tgg	agc	ctt	gtt	att	acg	caa	aga		560
Arg	Gln	Asn	Glu	Ala	Asp	Gly	Gln	Trp	Ser	Leu	Val	Ile	Thr	Gln	Arg		
		120					125					130					
caa	gac	tac	gag	aca	gca	acc	atg	cag	agc	tat	gtg	ttc	tca	atc	caa		608
Gln	Asp	Tyr	Glu	Thr	Ala	Thr	Met	Gln	Ser	Tyr	Val	Phe	Ser	Ile	Gln		
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gtg	gag	ggt	gaa	tca	cag	gcc	gta	ctg	gtg	gcg	ctg	gag	ata	gtc	aac		656
Val	Glu	Gly	Glu	Ser	Gln	Ala	Val	Leu	Val	Ala	Leu	Glu	Ile	Val	Asn		
150					155					160					165		
atc	gac	gac	aat	ccg	ccc	atc	ctg	caa	gtg	gtc	agc	gcc	tgc	gta	att		704
Ile	Asp	Asp	Asn	Pro	Pro	Ile	Leu	Gln	Val	Val	Ser	Ala	Cys	Val	Ile		
				170					175					180			
cca	gaa	cat	ggc	gag	gct	aga	ctg	acc	gac	tgc	gtg	tac	caa	gtg	tca		752
Pro	Glu	His		Gly	Glu	Ala	Arg	Leu	Thr	Asp	Cys	Val	Tyr	Gln	Val	Ser	
			185					190					195				
gac	cgc	gac	ggt	gaa	atc	agc	acc	cgc	ttc	atg	acg	ttc	cgt	gtc	gac		800
Asp	Arg	Asp	Gly	Glu	Ile	Ser	Thr	Arg	Phe	Met	Thr	Phe	Arg	Val	Asp		
		200					205					210					
agc	agc	agg	gct	gca	gat	gaa	agc	atc	ttc	tac	atg	gtt	gga	gaa	tac		848
Ser	Ser	Arg	Ala	Ala	Asp	Glu	Ser	Ile	Phe	Tyr	Met	Val	Gly	Glu	Tyr		
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gac	ccc	agc	gac	tgg	ttc	aat	atg	aag	atg	act	gtg	ggg	atc	aat	tcg		896
Asp	Pro	Ser	Asp	Trp	Phe	Asn	Met	Lys	Met	Thr	Val	Gly	Ile	Asn	Ser		
230				235						240					245		
ccc	ttg	aac	ttc	gag	aca	act	cag	ctt	cat	ata	ttt	agc	gtc	aca	gct		944
Pro	Leu	Asn	Phe	Glu	Thr	Thr	Gln	Leu	His	Ile	Phe	Ser	Val	Thr	Ala		
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tct	gac	tcg	cta	ccg	aac	aac	cac	acg	gtc	acc	atg	atg	gtg	caa	gtg		992
Ser	Asp	Ser	Leu	Pro	Asn	Asn	His	Thr	Val	Thr	Met	Met	Val	Gln	Val		
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gag	aac	gta	gag	tct	cgg	ccc	cct	cgc	tgg	gtg	gag	atc	ttc	tca	gtg		1040
Glu	Asn	Val	Glu	Ser	Arg	Pro	Pro	Arg	Trp	Val	Glu	Ile	Phe	Ser	Val		
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cag	cag	ttt	gac	gag	aag	act	aat	cag	agc	ttc	tcc	ctc	cgc	gcg	ata		1088
Gln	Gln	Phe	Asp	Glu	Lys	Thr	Asn	Gln	Ser	Phe	Ser	Leu	Arg	Ala	Ile		
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gac	ggg	gac	acg	gga	atc	aat	agg	gcc	atc	aac	tat	acc	ctc	atc	agg		1136
Asp	Gly	Asp	Thr	Gly	Ile	Asn	Arg	Ala	Ile	Asn	Tyr	Thr	Leu	Ile	Arg		
310					315					320					325		
gat	gac	gct	gac	gac	ttc	ttt	tcc	ctg	gag	gtg	att	gaa	gac	gga	gct		1184
Asp	Asp	Ala	Asp	Asp	Phe	Phe	Ser	Leu	Glu	Val	Ile	Glu	Asp	Gly	Ala		
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att	ctg	cac	gtg	act	gag	atc	gac	cgc	gac	aag	ctt	gaa	aga	gag	ctt		1232
Ile	Leu	His	Val	Thr	Glu	Ile	Asp	Arg	Asp	Lys	Leu	Glu	Arg	Glu	Leu		
			345					350					355				

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aca gag gcc cac att ttc atc atc gtc aac gac gtc aat gat cag cga Thr Glu Ala His Ile Phe Ile Ile Val Asn Asp Val Asn Asp Gln Arg 375 380 385	1328
ccc gag ccg ctg cat aaa gaa tac agt att gat atc atg gag gaa act Pro Glu Pro Leu His Lys Glu Tyr Ser Ile Asp Ile Met Glu Glu Thr 390 395 400 405	1376
cca atg act cta aac ttc aat gaa gaa ttt gga ttc cat gat cga gat Pro Met Thr Leu Asn Phe Asn Glu Glu Phe Gly Phe His Asp Arg Asp 410 415 420	1424
ttg ggt gaa aac gct caa tac aca gtg gaa ctt gag gac gtg ttc ccg Leu Gly Glu Asn Ala Gln Tyr Thr Val Glu Leu Glu Asp Val Phe Pro 425 430 435	1472
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agg cag acc ttc atc atg ggc acc ata aac cac acc atg ctg gat tac Arg Gln Thr Phe Ile Met Gly Thr Ile Asn His Thr Met Leu Asp Tyr 455 460 465	1568
gaa gat gtc att ttt cag aac atc atc att aag gtc aaa gca gtg gac Glu Asp Val Ile Phe Gln Asn Ile Ile Ile Lys Val Lys Ala Val Asp 470 475 480 485	1616
atg aac aac gct agc cac gtg ggc gag gcg ctg gtg tac gtg aac ctg Met Asn Asn Ala Ser His Val Gly Glu Ala Leu Val Tyr Val Asn Leu 490 495 500	1664
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Thr Val Thr Thr Gln Leu Val Ile Glu Leu Glu Asp Val Asn Asn Thr	
600 605 610	
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Pro Pro Thr Leu Arg Leu Pro Arg Ser Thr Pro Ser Val Glu Glu Asn	
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ggt ccc gaa gga tac gag ata tcc cgg gaa atc act gct acc gac ccg	2096
Val Pro Glu Gly Tyr Glu Ile Ser Arg Glu Ile Thr Ala Thr Asp Pro	
630 635 640 645	
gac acc agc gcc tac ctg tgg ttc gag atc gac tgg gac tcc acc tgg	2144
Asp Thr Ser Ala Tyr Leu Trp Phe Glu Ile Asp Trp Asp Ser Thr Trp	
650 655 660	
gcc acc aag cag gcc aga gag acc aac cct act gaa tac gtc ggg tgt	2192
Ala Thr Lys Gln Gly Arg Glu Thr Asn Pro Thr Glu Tyr Val Gly Cys	
665 670 675	
ata gtt atc gaa acg ata tac ccc acc gag ggc aac cgg ggt tcc gcc	2240
Ile Val Ile Glu Thr Ile Tyr Pro Thr Glu Gly Asn Arg Gly Ser Ala	
680 685 690	
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Ile Gly Arg Leu Val Val Gln Glu Ile Arg Asp Asn Val Thr Ile Asp	
695 700 705	
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Phe Glu Glu Phe Glu Met Leu Tyr Leu Thr Val Arg Val Arg Asp Leu	
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Asn Thr Val Ile Gly Asp Asp Tyr Asp Glu Ala Thr Phe Thr Ile Thr	
730 735 740	
ata atc gac atg aac gac aac gcg ccg atc ttc gcg aac ggc acg ctg	2432
Ile Ile Asp Met Asn Asp Asn Ala Pro Ile Phe Ala Asn Gly Thr Leu	
745 750 755	
acg cag acg atg cgc gtg cgc gag ctg gcg gcc agc ggc acg ctc atc	2480
Thr Gln Thr Met Arg Val Arg Glu Leu Ala Ala Ser Gly Thr Leu Ile	
760 765 770	
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Gly Ser Val Leu Ala Thr Asp Ile Asp Gly Pro Leu Tyr Asn Gln Val	
775 780 785	
cgc tac act ata caa cct aga aac aac act ccc gag gga tta gtg aag	2576
Arg Tyr Thr Ile Gln Pro Arg Asn Asn Thr Pro Glu Gly Leu Val Lys	
790 795 800 805	
att gac ttc aca act ggt caa att gag gtg gat gcg aac gag gcg atc	2624
Ile Asp Phe Thr Thr Gly Gln Ile Glu Val Asp Ala Asn Glu Ala Ile	
810 815 820	
gat gca gac gaa ccc tgg cgc ttc tac ttg tac tac acc gtc atc gct	2672
Asp Ala Asp Glu Pro Trp Arg Phe Tyr Leu Tyr Tyr Thr Val Ile Ala	
825 830 835	
agc gac gag tgc tcc ctg gaa aac cgc acg gaa tgt cct cca gat tcc	2720
Ser Asp Glu Cys Ser Leu Glu Asn Arg Thr Glu Cys Pro Pro Asp Ser	
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aac aac aaa gtg cct gag ccg ctc act gag aag ttc aac acg acg gtg Asn Asn Lys Val Pro Glu Pro Leu Thr Glu Lys Phe Asn Thr Thr Val 870 875 880 885	2816
tac gtc tgg gag aat gcc acg agc ggc gac gag gtg gtc cag ctg tac Tyr Val Trp Glu Asn Ala Thr Ser Gly Asp Glu Val Val Gln Leu Tyr 890 895 900	2864
tcc cac gac cgt gac aga gac gag ttg tac cac acg gta cga tac acg Ser His Asp Arg Asp Arg Asp Glu Leu Tyr His Thr Val Arg Tyr Thr 905 910 915	2912
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ctg gac act ggt cgc ctt gag gtg cat tac ccg ggg gac gaa aaa ttg Leu Asp Thr Gly Arg Leu Glu Val His Tyr Pro Gly Asp Glu Lys Leu 935 940 945	3008
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gat aac ttc ttt tct gat ggt gac ggt agg aga aac cag gac gaa gtt Asp Asn Phe Phe Ser Asp Gly Asp Gly Arg Arg Asn Gln Asp Glu Val 970 975 980	3104
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cca ttg cct gat gaa ctc ccg ttt gat gtt tcc gaa gga gca gtt gct Pro Leu Pro Asp Glu Leu Arg Phe Asp Val Ser Glu Gly Ala Val Ala 1000 1005 1010	3200
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gac acg gac aac tcg cgt gtc ggt tac gga atc ctg gac ctc acg atc Asp Thr Asp Asn Ser Arg Val Gly Tyr Gly Ile Leu Asp Leu Thr Ile 1030 1035 1040 1045	3296
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Gln Gln Arg Ser Asn Glu Thr Tyr Thr Leu Val Ile Arg Pro Tyr Asn 1095	1100	1105	
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1125			
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aac gag ttc ctg gag ccg atc tac gcc acc gac gag gac ggc ctc cac Asn Glu Phe Leu Glu Pro Ile Tyr Ala Thr Asp Glu Asp Gly Leu His 1145	1150	1155	3632
gcg ggc agc gtc acg ttc cac gtc cag gga aat gag gag gcc gtt cag Ala Gly Ser Val Thr Phe His Val Gln Gly Asn Glu Glu Ala Val Gln 1160	1165	1170	3680
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1205			
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cgt gag agt ttt gag ctg ccg caa gca gaa gac ctt aaa aac cac ctc Arg Glu Ser Phe Glu Leu Pro Gln Ala Glu Asp Leu Lys Asn His Leu 1255	1260	1265	3968
tgc gaa gat gac tgc caa gat atc tac tac agg ttt att gac ggc aac Cys Glu Asp Asp Cys Gln Asp Ile Tyr Tyr Arg Phe Ile Asp Gly Asn 1270	1275	1280	4016
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gcg gcg agc aac tcg ccc gac gcc act ggg atc cct ctg cag act tcc Ala Ala Ser Asn Ser Pro Asp Ala Thr Gly Ile Pro Leu Gln Thr Ser 1320	1325	1330	4160
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gag gcc gtc cgc agc gac acg gtg ctg ctg cgc acc atc cag ctg atg Glu Ala Val Arg Ser Asp Thr Val Leu Leu Arg Thr Ile Gln Leu Met 1530 1535 1540	4784
ctg agc acc aac agc ctg gtg ctg caa gac ctg gtg acg ggt gac act Leu Ser Thr Asn Ser Leu Val Leu Gln Asp Leu Val Thr Gly Asp Thr 1545 1550 1555	4832
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[illegible]



Leu	Glu	Ile	Val	Asn	Ile	Asp	Asp	Asn	Pro	Pro	Ile	Leu	Gln	Val	Val	165	170	175
Ser	Ala	Cys	Val	Ile	Pro	Glu	His	Gly	Glu	Ala	Arg	Leu	Thr	Asp	Cys	180	185	190
Val	Tyr	Gln	Val	Ser	Asp	Arg	Asp	Gly	Glu	Ile	Ser	Thr	Arg	Phe	Met	195	200	205
Thr	Phe	Arg	Val	Asp	Ser	Ser	Arg	Ala	Ala	Asp	Glu	Ser	Ile	Phe	Tyr	210	215	220
Met	Val	Gly	Glu	Tyr	Asp	Pro	Ser	Asp	Trp	Phe	Asn	Met	Lys	Met	Thr	225	230	235
Val	Gly	Ile	Asn	Ser	Pro	Leu	Asn	Phe	Glu	Thr	Thr	Gln	Leu	His	Ile	245	250	255
Phe	Ser	Val	Thr	Ala	Ser	Asp	Ser	Leu	Pro	Asn	Asn	His	Thr	Val	Thr	260	265	270
Met	Met	Val	Gln	Val	Glu	Asn	Val	Glu	Ser	Arg	Pro	Pro	Arg	Trp	Val	275	280	285
Glu	Ile	Phe	Ser	Val	Gln	Gln	Phe	Asp	Glu	Lys	Thr	Asn	Gln	Ser	Phe	290	295	300
Ser	Leu	Arg	Ala	Ile	Asp	Gly	Asp	Thr	Gly	Ile	Asn	Arg	Ala	Ile	Asn	305	310	315
Tyr	Thr	Leu	Ile	Arg	Asp	Asp	Ala	Asp	Asp	Phe	Phe	Ser	Leu	Glu	Val	325	330	335
Ile	Glu	Asp	Gly	Ala	Ile	Leu	His	Val	Thr	Glu	Ile	Asp	Arg	Asp	Lys	340	345	350
Leu	Glu	Arg	Glu	Leu	Phe	Asn	Leu	Thr	Ile	Val	Ala	Tyr	Lys	Ser	Thr	355	360	365
Asp	Ala	Ser	Phe	Ala	Thr	Glu	Ala	His	Ile	Phe	Ile	Ile	Val	Asn	Asp	370	375	380
Val	Asn	Asp	Gln	Arg	Pro	Glu	Pro	Leu	His	Lys	Glu	Tyr	Ser	Ile	Asp	385	390	395
Ile	Met	Glu	Glu	Thr	Pro	Met	Thr	Leu	Asn	Phe	Asn	Glu	Glu	Phe	Gly	405	410	415
Phe	His	Asp	Arg	Asp	Leu	Gly	Glu	Asn	Ala	Gln	Tyr	Thr	Val	Glu	Leu	420	425	430
Glu	Asp	Val	Phe	Pro	Pro	Gly	Ala	Ala	Ser	Ala	Phe	Tyr	Ile	Ala	Pro	435	440	445
Gly	Ser	Gly	Tyr	Gln	Arg	Gln	Thr	Phe	Ile	Met	Gly	Thr	Ile	Asn	His	450	455	460
Thr	Met	Leu	Asp	Tyr	Glu	Asp	Val	Ile	Phe	Gln	Asn	Ile	Ile	Ile	Lys	465	470	475
Val	Lys	Ala	Val	Asp	Met	Asn	Asn	Ala	Ser	His	Val	Gly	Glu	Ala	Leu	485	490	495
Val	Tyr	Val	Asn	Leu	Ile	Asn	Trp	Asn	Asp	Glu	Leu	Pro	Ile	Phe	Glu	500	505	510
Glu	Ser	Ser	Tyr	Ser	Ala	Ser	Phe	Lys	Glu	Thr	Val	Gly	Ala	Gly	Phe	515	520	525
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Ile Gln Val Pro Asn Leu Phe Asn Met Ile Thr Ile Glu Arg Asp Arg	
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Gly Ile Asp Gln Thr Gly Ile Leu Glu Ala Ala Met Asp Leu Arg Gly	
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Tyr Trp Gly Thr Tyr Gln Ile Asp Ile Gln Ala Tyr Asp His Gly Ile	
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Pro Gln Arg Ile Ser Asn Gln Lys Tyr Pro Leu Val Ile Arg Pro Tyr	
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Asn Phe His Asp Pro Val Phe Val Phe Pro Gln Pro Gly Ser Thr Ile	
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Asn Leu Leu Thr Leu Val Ala Thr His Ser Glu Asp Leu Pro Ile Thr 1380	1385	1390	
tac act ctg ata caa gag tcc atg gaa gca gac ccc aca ctc gaa gct Tyr Thr Leu Ile Gln Glu Ser Met Glu Ala Asp Pro Thr Leu Glu Ala 1395	1400	1405	4400
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Pro Pro Thr Leu Arg Leu Pro Arg Ala Thr Pro Ser Val Glu Glu Asn				
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Val Pro Asp Gly Phe Val Ile Pro Thr Gln Leu His Ala Thr Asp Pro				
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Asp Thr Thr Ala Glu Leu Arg Phe Glu Ile Asp Trp Gln Asn Ser Tyr				
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Thr	Gln	Glu	Phe	Arg	Val	Arg	Glu	Val	Ala	Ala	Ser	Gly	Val	Val
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Asp	Ala	Asp	Glu	Pro	Pro	Arg	Gln	Asn	Leu	Tyr	Tyr	Thr	Val	Ile
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Ser	Asp	Lys	Cys	Asp	Leu	Leu	Thr	Val	Thr	Glu	Cys	Pro	Pro	Asp
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Asn	Asn	Lys	Val	Pro	Gln	Val	Glu	Asp	Asp	Lys	Phe	Glu	Ala	Thr
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Tyr	Ile	Tyr	Glu	Gly	Ala	Asp	Asp	Gly	Gln	His	Val	Val	Gln	Ile
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Ala	Ser	Asp	Leu	Asp	Arg	Asp	Glu	Ile	Tyr	His	Lys	Val	Ser	Tyr
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Pro	Tyr	Asn	Phe	His	Asp	Pro	Val	Phe	Val	Phe	Pro	Gln	Pro	Gly
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Thr	Ile	Arg	Leu	Ala	Lys	Glu	Arg	Ala	Val	Val	Asn	Gly	Ile	Leu
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1170					1175					1180				
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 Pro Asp Pro Trp Ser Asn Asn His Gly Asp Gln Arg Ile Tyr Met Glu  
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cgg gct aaa gac aga gac atc ggt gac ata gtc gag cac tcg ata ttg Arg Ala Lys Asp Arg Asp Ile Gly Asp Ile Val Glu His Ser Ile Leu 550 555 560 565			1856
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gct acc aca cag ctc acg ata ttt ttg gaa gac atc aac aac acg cca Ala Thr Thr Gln Leu Thr Ile Phe Leu Glu Asp Ile Asn Asn Thr Pro 615 620 625			2048
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gaa gtc ggg cac ccg att acc gag ggg cta acg gcg aca gac cca gac Glu Val Gly His Pro Ile Thr Glu Gly Leu Thr Ala Thr Asp Pro Asp 650 655 660			2144

acc aca gcc gat tta cac ttc gag atc gat tgg gac aat tct tac gct Thr Thr Ala Asp Leu His Phe Glu Ile Asp Trp Asp Asn Ser Tyr Ala 665 670 675	2192
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ata atc gat atg aac gac aac tgg ccg ata tgg gcc gac aac acg ctg Ile Ile Asp Met Asn Asp Asn Trp Pro Ile Trp Ala Asp Asn Thr Leu 760 765 770	2480
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1400	1405	1410	
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Pro Gly Ser Asn Pro Phe Tyr Asn Pro Asp Val Lys Thr Pro Asn Phe	
1655 1660 1665	
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1670 1675 1680 1685	
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Glu Gln Phe Gly Lys Asp Tyr Phe Pro Pro Glu Asn Glu Ile Glu Ser	
1690 1695 1700	
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Leu Asn Phe Ala Arg Asn Pro Ile Ala Thr His Gly Asn Asn Phe Gly	
1705 1710 1715	
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Val Asn Ser Ser Pro Ser Asn Pro Glu Phe Ser Asn Ser Gln Phe Arg	
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Ser	

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Arg Pro Asp Arg Pro Asp Phe Pro Pro Gln Asn Phe Asp Gly Leu Thr	
35 40 45	
Trp Ala Gln Gln Pro Leu Leu Pro Ala Glu Asp Arg Glu Glu Val Cys	
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Arg Ile Tyr Met Glu Glu Glu Ile Glu Gly Pro Val Val Ile Ala Lys	
85 90 95	
Ile Asn Tyr Gln Gly Asn Thr Pro Pro Gln Ile Arg Leu Pro Phe Arg	
100 105 110	
Val Gly Ala Ala His Met Leu Gly Ala Glu Ile Arg Glu Tyr Pro Asp	
115 120 125	
Ala Thr Gly Asp Trp Tyr Leu Val Ile Thr Gln Arg Gln Asp Tyr Glu	
130 135 140	
Thr Pro Asp Met Gln Arg Tyr Thr Phe Asp Val Ser Val Glu Gly Gln	
145 150 155 160	
Ser Leu Val Val Thr Val Arg Leu Asp Ile Val Asn Ile Asp Asp Asn	
165 170 175	
Ala Pro Ile Ile Glu Met Leu Glu Pro Cys Asn Leu Pro Glu Leu Val	
180 185 190	
Glu Pro His Val Thr Glu Cys Lys Tyr Ile Val Ser Asp Ala Asp Gly	
195 200 205	
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210 215 220	

Asp	Glu	Lys	Val	Phe	Glu	Leu	Ile	Arg	Lys	Asp	Tyr	Pro	Gly	Asp	Trp
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Thr	Lys	Val	Tyr	Met	Val	Leu	Glu	Leu	Lys	Lys	Ser	Leu	Asp	Tyr	Glu
				245					250					255	
Glu	Asn	Pro	Leu	His	Ile	Phe	Arg	Val	Thr	Ala	Ser	Asp	Ser	Leu	Pro
			260					265					270		
Asn	Asn	Arg	Thr	Val	Val	Met	Met	Val	Glu	Val	Glu	Asn	Val	Glu	His
		275					280					285			
Arg	Asn	Pro	Arg	Trp	Met	Glu	Ile	Phe	Ala	Val	Gln	Gln	Phe	Asp	Glu
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Lys	Gln	Ala	Lys	Ser	Phe	Thr	Val	Arg	Ala	Ile	Asp	Gly	Asp	Thr	Gly
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Ile	Asn	Lys	Pro	Ile	Phe	Tyr	Arg	Ile	Glu	Thr	Glu	Asp	Glu	Asp	Lys
				325					330					335	
Glu	Phe	Phe	Ser	Ile	Glu	Asn	Ile	Gly	Glu	Gly	Arg	Asp	Gly	Ala	Arg
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Phe	His	Val	Ala	Pro	Ile	Asp	Arg	Asp	Tyr	Leu	Lys	Arg	Asp	Met	Phe
		355					360					365			
His	Ile	Arg	Ile	Ile	Ala	Tyr	Lys	Gln	Gly	Asp	Asn	Asp	Lys	Glu	Gly
	370					375				380					
Glu	Ser	Ser	Phe	Glu	Thr	Ser	Ala	Asn	Val	Thr	Ile	Ile	Ile	Asn	Asp
385					390					395					400
Ile	Asn	Asp	Gln	Arg	Pro	Glu	Pro	Phe	His	Lys	Glu	Tyr	Thr	Ile	Ser
				405					410					415	
Ile	Met	Glu	Glu	Thr	Ala	Met	Thr	Leu	Asp	Leu	Gln	Glu	Phe	Gly	Phe
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His	Asp	Arg	Asp	Ile	Gly	Pro	His	Ala	Gln	Tyr	Asp	Val	His	Leu	Glu
	435					440						445			
Ser	Ile	Gln	Pro	Glu	Gly	Ala	His	Thr	Ala	Phe	Tyr	Ile	Ala	Pro	Glu
	450					455				460					
Glu	Gly	Tyr	Gln	Ala	Gln	Ser	Phe	Thr	Ile	Gly	Thr	Arg	Ile	His	Asn
465					470					475					480
Met	Leu	Asp	Tyr	Glu	Asp	Asp	Asp	Tyr	Arg	Pro	Gly	Ile	Lys	Leu	Lys
				485					490					495	
Ala	Val	Ala	Ile	Asp	Arg	His	Asp	Asn	Asn	His	Ile	Gly	Glu	Ala	Ile
			500					505					510		
Ile	Asn	Ile	Asn	Leu	Ile	Asn	Trp	Asn	Asp	Glu	Leu	Pro	Ile	Phe	Asp
	515						520					525			
Glu	Asp	Ala	Tyr	Asn	Val	Thr	Phe	Glu	Glu	Thr	Val	Gly	Asp	Gly	Phe
	530					535					540				
His	Ile	Gly	Lys	Tyr	Arg	Ala	Lys	Asp	Arg	Asp	Ile	Gly	Asp	Ile	Val
545					550					555					560
Glu	His	Ser	Ile	Leu	Gly	Asn	Ala	Ala	Asn	Phe	Leu	Arg	Ile	Asp	Ile
				565					570					575	
Asp	Thr	Gly	Asp	Val	Tyr	Val	Ser	Arg	Asp	Asp	Tyr	Phe	Asp	Tyr	Gln
			580					585					590		
Arg	Gln	Asn	Glu	Ile	Ile	Val	Gln	Ile	Leu	Ala	Val	Asp	Thr	Leu	Gly
		595					600					605			
Leu	Pro	Gln	Asn	Arg	Ala	Thr	Thr	Gln	Leu	Thr	Ile	Phe	Leu	Glu	Asp
	610					615					620				
Ile	Asn	Asn	Thr	Pro	Pro	Ile	Leu	Arg	Leu	Pro	Arg	Ser	Ser	Pro	Ser
625					630					635					640
Val	Glu	Glu	Asn	Val	Glu	Val	Gly	His	Pro	Ile	Thr	Glu	Gly	Leu	Thr
				645					650					655	
Ala	Thr	Asp	Pro	Asp	Thr	Thr	Ala	Asp	Leu	His	Phe	Glu	Ile	Asp	Trp
			660					665					670		
Asp	Asn	Ser	Tyr	Ala	Thr	Lys	Gln	Gly	Thr	Asn	Gly	Pro	Asn	Thr	Ala
			675				680					685			
Asp	Tyr	His	Gly	Cys	Val	Glu	Ile	Leu	Thr	Val	Tyr	Pro	Asp	Pro	Asp
	690					695					700				
Asn	His	Gly	Arg	Ala	Glu	Gly	His	Leu	Val	Ala	Arg	Glu	Val	Ser	Asp
705					710					715					720

Gly	Val	Thr	Ile	Asp	Tyr	Glu	Lys	Phe	Glu	Val	Leu	Tyr	Leu	Val	Val	725	730	735
Arg	Val	Ile	Asp	Arg	Asn	Thr	Val	Ile	Gly	Pro	Asp	Tyr	Asp	Glu	Ala	740	745	750
Met	Leu	Thr	Val	Thr	Ile	Ile	Asp	Met	Asn	Asp	Asn	Trp	Pro	Ile	Trp	755	760	765
Ala	Asp	Asn	Thr	Leu	Gln	Gln	Thr	Leu	Arg	Val	Arg	Glu	Met	Ala	Asp	770	775	780
Glu	Gly	Val	Ile	Val	Gly	Thr	Leu	Leu	Ala	Thr	Asp	Leu	Asp	Gly	Pro	785	790	795
Leu	Tyr	Asn	Arg	Val	Arg	Tyr	Thr	Met	Val	Pro	Ile	Lys	Asp	Thr	Pro	805	810	815
Asp	Asp	Leu	Ile	Ala	Ile	Asn	Tyr	Val	Thr	Gly	Gln	Leu	Thr	Val	Asn	820	825	830
Lys	Gly	Gln	Ala	Ile	Asp	Ala	Asp	Asp	Pro	Pro	Arg	Phe	Tyr	Leu	Tyr	835	840	845
Tyr	Lys	Val	Thr	Ala	Ser	Asp	Lys	Cys	Ser	Leu	Asp	Glu	Phe	Phe	Pro	850	855	860
Val	Cys	Pro	Pro	Asp	Pro	Thr	Tyr	Trp	Asn	Thr	Glu	Gly	Glu	Ile	Ala	865	870	875
Ile	Ala	Ile	Thr	Asp	Thr	Asn	Asn	Lys	Ile	Pro	Arg	Ala	Glu	Thr	Asp	885	890	895
Met	Phe	Pro	Ser	Glu	Lys	Arg	Ile	Tyr	Glu	Asn	Thr	Pro	Asn	Gly	Thr	900	905	910
Lys	Ile	Thr	Thr	Ile	Ile	Ala	Ser	Asp	Gln	Asp	Arg	Asp	Arg	Pro	Asn	915	920	925
Asn	Ala	Leu	Thr	Tyr	Arg	Ile	Asn	Tyr	Ala	Phe	Asn	His	Arg	Leu	Glu	930	935	940
Asn	Phe	Phe	Ala	Val	Asp	Pro	Asp	Thr	Gly	Glu	Leu	Phe	Val	His	Phe	945	950	955
Thr	Thr	Ser	Glu	Val	Leu	Asp	Arg	Asp	Gly	Glu	Glu	Pro	Glu	His	Arg	965	970	975
Ile	Ile	Phe	Thr	Ile	Val	Asp	Asn	Leu	Glu	Gly	Ala	Gly	Asp	Gly	Asn	980	985	990
Gln	Asn	Thr	Ile	Ser	Thr	Glu	Val	Arg	Val	Ile	Leu	Leu	Asp	Ile	Asn	995	1000	1005
Asp	Asn	Lys	Pro	Glu	Leu	Pro	Ile	Pro	Asp	Gly	Glu	Phe	Trp	Thr	Val	1010	1015	1020
Ser	Glu	Gly	Glu	Val	Glu	Gly	Lys	Arg	Ile	Pro	Pro	Glu	Ile	His	Ala	1025	1030	1035
His	Asp	Arg	Asp	Glu	Pro	Phe	Asn	Asp	Asn	Ser	Arg	Val	Gly	Tyr	Glu	1045	1050	1055
Ile	Arg	Ser	Ile	Lys	Leu	Ile	Asn	Arg	Asp	Ile	Glu	Leu	Pro	Gln	Asp	1060	1065	1070
Pro	Phe	Lys	Ile	Ile	Thr	Ile	Asp	Asp	Leu	Asp	Thr	Trp	Lys	Phe	Val	1075	1080	1085
Gly	Glu	Leu	Glu	Thr	Thr	Met	Asp	Leu	Arg	Gly	Tyr	Trp	Gly	Thr	Tyr	1090	1095	1100
Asp	Val	Glu	Ile	Arg	Ala	Phe	Asp	His	Gly	Phe	Pro	Met	Leu	Asp	Ser	1105	1110	1115
Phe	Glu	Thr	Tyr	Gln	Leu	Thr	Val	Arg	Pro	Tyr	Asn	Phe	His	Ser	Pro	1125	1130	1135
Val	Phe	Val	Phe	Pro	Thr	Pro	Gly	Ser	Thr	Ile	Arg	Leu	Ser	Arg	Glu	1140	1145	1150
Arg	Ala	Ile	Val	Asn	Gly	Met	Leu	Ala	Leu	Ala	Asn	Ile	Ala	Ser	Gly	1155	1160	1165
Glu	Phe	Leu	Asp	Arg	Leu	Ser	Ala	Thr	Asp	Glu	Asp	Gly	Leu	His	Ala	1170	1175	1180
Gly	Arg	Val	Thr	Phe	Ser	Ile	Ala	Gly	Asn	Asp	Glu	Ala	Ala	Glu	Tyr	1185	1190	1195
Phe	Asn	Val	Leu	Asn	Asp	Gly	Asp	Asn	Ser	Ala	Met	Leu	Thr	Leu	Lys	1205	1210	1215



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 Phe Gln Leu Pro Gln Ala Asp Asp Pro Lys Asn Tyr Arg Cys Met Asp  
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 Phe Tyr Thr Ala Gly Val Leu His Thr Asp Ser Ile His Lys Glu Leu  
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 Gly Gly Glu Tyr Ala Leu Ala Val Tyr Ile Leu Ala Gly Ile Ala Ala  
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 Lys Thr Pro Asn Phe Asp Thr Ile Ser Glu Val Ser Asp Asp Leu Leu  
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